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Report on the individual review of the annual submission of Denmark submitted in 2014*

* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2014 annual submission of Denmark, coordinated by the UNFCCC secretariat, in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines). The review took place from 1 to 6 September 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Ingrid Person Rocha e Pinho (Brazil) and Ms. Daniela Romano (Italy); energy – Ms. Ana Carolina Avzaradel (Brazil), Mr. Alexey Cherednichenko (Kazahkstan) and Mr. Lawrence Kotoe (Ghana); industrial processes and solvent and other product use – Ms. Siriluk Chiarakorn (Thailand) and Ms. Natalya Parasyuk (Ukraine); agriculture – Mr. Jonas Bergström (Sweden) and Mr. Donald Kamdonyo (Malawi); land use, land-use change and forestry (LULUCF) – Ms. Shari Hayne (Canada), Mr. Doru Leonard Irimie (Romania) and Ms. Marina Vitullo (Italy); and waste – Ms. Medea Inashvili (Georgia), Ms. Sandra Jones (New Zealand) and Ms. Irina Yesserkepova (Kazahkstan). Ms. Inashvili and Ms. Romano were the lead reviewers. The review was coordinated by Ms. Lisa Hanle (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of Denmark, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified. The expert review team (ERT) notes that the 2013 annual review report of Denmark was published after 15 April 2014, which may have affected the Party's ability to implement recommendations and encouragements made in the previous review report.

3. All recommendations and encouragements included in this report are based on the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised "Guidelines for the preparation of national communications by Parties include in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" adopted through decision 24/CP.19. Therefore, when preparing the 2015 annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report, in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by Denmark was carbon dioxide (CO_2), accounting for 76.5 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by nitrous oxide (N_2O) (11.4 per cent) and methane (CH_4) (10.5 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.5 per cent of the overall GHG emissions in the country. The energy sector accounted for 75.8 per cent of total GHG emissions, followed by the agriculture sector (18.4 per cent), the industrial processes sector (3.4 per cent), the waste sector (2.1 per cent) and the solvent and other product use sector (0.3 per cent). Total GHG emissions amounted to 52,247.69 Gg CO_2 eq and decreased by 24.9 per cent between the base year[2] and 2012. The ERT concluded that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 equivalent excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from sources included in Annex A to the Kyoto Protocol only.

5. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.

6. Information to be included in the compilation and accounting database can be found in annex I to this report.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year[a] to 2012

			Gg CO_2 eq								*Change (%)*
		Greenhouse gas	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year–2012*
Annex A sources		CO_2	53 532.57	53 532.57	61 522.13	51 601.00	49 171.87	49 580.73	44 751.90	39 984.59	–25.3
		CH_4	5 936.18	5 936.18	6 082.95	5 669.12	5 582.11	5 623.25	5 559.10	5 503.37	–7.3
		N_2O	9 799.28	9 799.28	8 770.75	6 444.98	6 083.07	6 046.56	6 114.18	5 968.96	–39.1
		HFCs	217.75	NA, NE, NO	217.75	859.25	805.41	810.95	765.78	664.38	205.1
		PFCs	0.50	NA, NO	0.50	12.79	14.18	13.27	11.06	8.54	1 599.4
		SF_6	107.37	44.45	107.37	31.60	36.69	37.88	73.19	117.85	9.8
KP-LULUCF	Article 3.3[b]	CO_2				474.52	–135.54	–197.63	–34.34	147.09	
		CH_4				NO	NO	NO	NO	NO	
		N_2O				0.22	0.22	0.23	0.23	0.94	
	Article 3.4[c]	CO_2	5 022.23			–2 105.91	3 134.10	–163.56	–2 750.35	–1 009.28	NA
		CH_4	0.00			0.00	0.00	0.00	0.00	0.02	834.0
		N_2O	0.00			12.36	12.19	12.19	12.20	12.20	–24.2

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NE = not estimated, NO = not occurring.

[a] The base year for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2012

			Gg CO_2 eq							Change (%)
		Sector	Base year	1990	1995	2008	2009	2010	2011	2012	Base year–2012
Annex A sources		Energy	52 799.54	52 799.54	60 764.30	51 036.26	48 987.79	49 509.62	44 436.83	39 583.06	–25.0
		Industrial processes	2 520.69	2 239.52	2 726.81	2 261.98	1 771.75	1 695.22	1 858.40	1 797.86	–28.7
		Solvent and other product use	116.40	116.40	137.36	157.38	158.47	181.01	167.81	156.55	34.5
		Agriculture	12 535.06	12 535.06	11 579.05	9 948.99	9 603.76	9 617.92	9 677.53	9 608.67	–23.3
		Waste	1 621.96	1 621.96	1 493.93	1 214.13	1 171.54	1 108.88	1 134.62	1 101.56	–32.1
		LULUCF	NA	5 282.76	3 671.63	–1 596.96	3 045.69	–322.84	–2 741.58	–837.12	NA
		Total (with LULUCF)	**NA**	**74 595.25**	**80 373.09**	**63 021.77**	**64 739.01**	**61 789.81**	**54 533.62**	**51 410.58**	**NA**
		Total (without LULUCF)	**69 593.66**	**69 312.49**	**76 701.46**	**64 618.73**	**61 693.32**	**62 112.65**	**57 275.20**	**52 247.69**	**–24.9**
		Other[b]	**NA**	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation				393.43	–216.19	–279.79	–119.19	37.83	
		Deforestation				81.32	80.88	82.38	85.07	110.20	
		Total (3.3)				**474.74**	**–135.31**	**–197.41**	**–34.11**	**148.03**	
	Article 3.4[d]	Forest management				–6 097.55	259.39	–3 754.70	–6 180.04	–4 479.35	
		Cropland management	4 844.66			3 768.04	2 663.52	3 388.51	3 196.18	2 957.76	–38.9
		Grazing land management	177.57			235.97	223.37	214.83	245.71	524.52	195.4
		Revegetation	NA			NA	NA	NA	NA	NA	NA
		Total (3.4)	**5 022.23**			**–2 093.54**	**3 146.28**	**–151.36**	**–2 738.15**	**–997.06**	**NA**

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 15 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 and an NIR. Denmark further submitted a revised NIR on 8 May 2014. Denmark also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. The list of other materials used during the review is provided in annex II to this report.

2. Question(s) of implementation raised in the 2013 annual review report

9. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

3. Overall assessment of the inventory

10. Table 3 contains the ERT's overall assessment of the annual submission of Denmark. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

Issue	*Expert review team assessment*	*General findings and recommendations*
The ERT's findings on completeness		
Annex A sources[a]	Complete	Mandatory: none
		Non-mandatory: N_2O emissions from aerosol cans and from other uses of N_2O; CH_4 emissions from direct soil emissions and indirect emissions from agricultural soils; CO_2 emissions from managed waste disposal on land; and N_2O emissions from accidental fires (other (waste))
		The ERT encourages the Party to estimate and report emissions from all non-mandatory categories
Land use, land-use change	Complete	Mandatory: none

Issue	*Expert review team assessment*	*General findings and recommendations*
and forestry[a]		Non-mandatory: N_2O emissions from flooded lands and CH_4 emissions from forest land and wetlands from the category non-CO_2 emissions from drainage of soils and wetlands in Greenland; and CO_2, CH_4 and N_2O emissions from harvested wood products The ERT encourages the Party to estimate and report emissions from all non-mandatory categories
KP-LULUCF	Complete	
The ERT's findings on recalculations and time-series consistency		
Transparency of recalculations	Sufficiently transparent	Although, in general, the report is sufficiently transparent with regard to recalculations, there are still some pending issues in the LULUCF and waste sectors Please see paragraphs 47, 58 and 70 below for category-specific findings
Time-series consistency	Sufficiently consistent	Please see paragraph 34 below for category-specific findings
The ERT's findings on QA/QC procedures	Sufficient	Denmark has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures in accordance with that plan. However, the ERT identified some issues which suggest that the tier 1 QC procedures are not always appropriately implemented, especially in the energy, industrial processes and LULUCF sectors Please see paragraphs 11, 24, 30, 31, 33, 36, 53, 55, 56, 59 and 77 below for category-specific recommendations
The ERT's findings on transparency	Not sufficiently transparent	Please see paragraphs 22, 24, 29, 30, 31, 35, 42, 43, 45, 48, 49, 52, 54, 66, 70, 77 and 79 below for category-specific recommendations

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, ERT = expert review team, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NE = not estimated, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

11. Based on the information included in CRF summary table 3, the data are largely consistent with information in the NIR. However, a number of inconsistencies were still identified in the 2014 annual submission, such as: for the energy sector, NIR table 3.5.3

states that tier 3 ("T3") methods were used for venting/flaring, but CRF summary table 3 states that only tier 1 ("T1") methods were used for N_2O emissions. For the industrial processes sector, there are observed differences: for mineral products (CO_2 emissions), the NIR states that "T1", tier 2 ("T2") and "T3" methods were used, whereas the CRF table indicates that country-specific ("CS") and "T1" methods were used; for chemicals (N_2O emissions), the NIR states that "T1" and plant-specific ("PS") emission factors (EFs) were used, while the emissions are reported in the CRF table using the notation key "NA" (not applicable); and for consumption of halocarbons and SF_6 (HFCs and PFCs), CRF summary table 3 is blank. For the agriculture sector, the NIR states that tier 1b "T1b"/"CS" methods were used for agricultural soils, while the CRF table states that "CS", default ("D"), tier 1a ("T1a") and "T1b" methods were used. For the LULUCF sector, NIR table 7.1 is largely inconsistent with CRF summary table 3. For the waste sector, the NIR indicates that "CS" methods and EFs were used to report N_2O emissions from wastewater handling, while CRF summary table 3 also refers to the use of "T1" methods and "D" EFs. In response to questions raised during earlier stages of the review, the Party responded that it will check the information regarding the methods and EFs used thoroughly in the next annual submission and that the information in the NIR is correct for the 2014 annual submission. The ERT concluded that Denmark has not yet shown consistency between the NIR and the CRF tables (summary table 3) in the 2014 annual submission and recommends that the Party enhance quality control (QC) activities to avoid such inconsistencies between the NIR and CRF tables.

4. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

12. The NIR described the national system for the preparation of the inventory. As indicated by the Party in its NIR, there were no changes to the inventory planning process. The description of the inventory planning process, as contained in the report of the individual review of the annual submission of Denmark submitted in 2013,[3] remains relevant.

Inventory preparation

13. Table 4 contains the ERT's assessment of Denmark's inventory preparation process.

Table 4
Assessment of inventory preparation by Denmark

Issue	*Expert review team assessment*	*ERT findings and recommendations*
Key category analysis		
Was the key category analysis performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	Level and trend analysis performed, including and excluding LULUCF
Approach followed?	Both tier 1 and tier 2	A tier 2 key category analysis including and excluding LULUCF, both level and trend assessment, has been provided for mainland

[3] FCCC/ARR/2013/DNK, paragraphs 9 and 10.

Issue	*Expert review team assessment*	*ERT findings and recommendations*
		Denmark only, while a tier 1 key category analysis including and excluding LULUCF, both level and trend assessment, has been provided for Greenland The ERT encourages the Party to make efforts to conduct a tier 2 key category analysis for the aggregated inventory of Denmark and Greenland for future annual submissions
Were additional key categories identified using a qualitative approach?	No	
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
Assessment of uncertainty analysis		
Approach followed?	Both tier 1 and tier 2	An IPCC tier 1 uncertainty analysis has been performed for all sectors, and a tier 2 uncertainty assessment has been carried out for all sectors, except for the LULUCF sector; the results of this analysis are presented both at a summary level and at the individual source category level; both analyses were conducted in 2013
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	
Quantitative uncertainty (including LULUCF)	Level = ±6.9% Trend = ±2.6%	
Quantitative uncertainty	Level = ±5.6% (tier 1)	

Issue	*Expert review team assessment*	*ERT findings and recommendations*
(excluding LULUCF)	Level =	
	+6.7% and –4.5% (tier 2)	
	Trend = ±2.5% (tier 1)	
	Trend =	
	+9.2% and –7.4% (tier 2)	

Abbreviations: ERT = expert review team, IPCC good practice guidance = Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, LULUCF = land use, land-use change and forestry.

Inventory management

14. There were no changes to the inventory management process carried out by Denmark for the 2014 annual submission, as indicated by the Party in its NIR. The description of the inventory management process, as contained in the report of the individual review of the annual submission of Denmark submitted in 2013,[4] remains relevant.

5. Follow-up to previous reviews

15. The NIR includes information on Denmark's responses to the main recommendations made in the 2008, 2009, 2010, 2011 and 2012 annual review reports in the recalculations chapter of the NIR, as well as in the sectoral chapters. In the NIR, Denmark highlighted that recommendations made in the 2013 annual review report were not implemented because of the delay in the availability of the draft 2013 annual review report (available 7 April 2014).

16. Recommendations made in previous reviews that have not yet been implemented, as well as issues the ERT identified during the 2014 annual review, are discussed in the relevant sectoral chapters of the report and in table 12 below.

B. Energy

1. Sector overview

17. The energy sector is the main sector in the GHG inventory of Denmark. In 2012, emissions from the energy sector amounted to 39,583.06 Gg CO_2 eq, or 75.8 per cent of total GHG emissions. Since 1990, emissions have decreased by 25.0 per cent. The key drivers for the fall in emissions are the increasing import of electricity and the increasing production of wind power. Within the sector, 42.6 per cent of the emissions were from energy industries, followed by 31.2 per cent from transport, 14.1 per cent from other sectors and 10.9 per cent from manufacturing industries and construction. Fugitive emissions from oil and natural gas accounted for 0.8 per cent, and other (fuel combustion activities) accounted for 0.3 per cent. Fugitive emissions from solid fuels were reported as "NO" (not occurring).

18. Denmark has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculation made by Denmark between the 2013 and 2014 annual submissions was in the following category: manufacturing industries and

[4] FCCC/ARR/2013/DNK, paragraph 12.

construction. The recalculations were made in response to recommendations made in the 2013 annual review report and following changes in activity data (AD), as well as in EFs, in order to rectify identified errors. Compared with the 2013 annual submission, the recalculations increased emissions in the energy sector by 158.17 Gg CO_2 eq (0.4 per cent), and increased total national GHG emissions by 0.3 per cent in 2011. The recalculations were adequately explained.

2. Reference and sectoral approaches

19. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 20–22 below.

Table 5
Review of reference and sectoral approaches

Issue	*Expert review team assessment*	*Paragraph cross references*
Difference between the reference approach and the sectoral approach	Energy consumption: –5.05 PJ, –0.96% CO_2 emissions: –358.60 Gg CO_2, –0.93%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	
Are differences with international statistics adequately explained?	Yes	
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes	22

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

20. No problems were identified.

International bunker fuels

21. No problems were identified.

Feedstocks and non-energy use of fuels

22. The previous review report noted that Denmark uses a carbon storage factor of 1.00 for lubricants in CRF table 1.A(d), with the Party providing the rationale that these emissions are not used for energy purposes but rather are consumed in the industrial processes sector. The previous review report noted that the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) assume that 50 per cent of lubricants are lost as CO_2 during the life cycle, and recommended that the Party provide additional information to demonstrate that there was no underestimation of

emissions. In the 2014 NIR, Denmark provided information on the rationale for the inclusion of lubricants in the industrial processes sector (category other). The ERT commends the Party for providing this detailed information on the use and allocation of lubricants in its annual submission.

3. Key categories

Stationary combustion: liquid fuels – CO_2

23. In its 2014 annual submission, Denmark has updated the CO_2 EF for gas oil (72.24 kg/GJ) for Greenland based on a technical fuel analysis conducted by the Danish Technological Institute in 2012. Gas oil is the most dominant liquid fuel in Greenland, responsible for approximately 79 per cent of all liquid fuels used in 2012. Further discussion of the technical fuel analysis can be found in section 16.3.3 of the NIR. The ERT welcomes this improvement.

4. Non-key categories

Stationary combustion: gaseous fuels – N_2O

24. The previous two annual review reports noted that the implied emission factor (IEF) for N_2O emissions from manufacture of solid fuels and other energy industries had declined; in the 2014 annual submission, the IEF declined from 2.20 kg/TJ in 1990 to 1.00 kg/TJ in 2012. In response to questions raised by the ERTs during previous reviews, Denmark explained that the trend is expected because the Party uses the N_2O EF for natural gas fuelled gas turbines in Danish combined heat and power plants for both onshore and offshore natural gas turbines, as opposed to applying different EFs to the turbines typically found in offshore operations. The Party concludes that this is a valid assumption as there is no evidence to suggest that these types of turbines have different emission characteristics for N_2O. Therefore, the N_2O IEF of the offshore turbines has been assumed to be equal to that of the onshore natural gas fuelled gas turbines, which has declined over the time series. In previous review reports, the ERT recommended that Denmark include this rationale in the NIR. Noting that no new information was provided in the 2013 NIR or the 2014 NIR, the current ERT requested a clarification from Denmark. In response to a question raised by the ERT during the review, Denmark confirmed that the responses provided to the previous ERTs were still valid, and that the NIR was unfortunately not updated to address the recommendation. The Party further confirmed that data in the CRF tables are correct for all submissions, as are the EFs and the references shown in the EF tables in the NIRs. The ERT reiterates the recommendation made in the previous review reports that Denmark provide this explanation in its NIR in order to improve transparency and also that the Party improve its quality assurance (QA)/QC procedures and follow up on the recommendations made in previous review reports.

C. Industrial processes and solvent and other product use

1. Sector overview

25. In 2012, emissions from the industrial processes sector amounted to 1,797.86 Gg CO_2 eq, or 3.4 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 156.55 Gg CO_2 eq, or 0.3 per cent of total GHG emissions. Since the base year, emissions have decreased by 28.7 per cent in the industrial processes sector, and increased by 34.5 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector is the reduction in emissions from the chemical industry due to the closure of a nitric acid production plant in Denmark in 2004. At the peak of its production in 1990, the emissions from nitric acid

production (1,042.90 Gg CO_2 eq) contributed 46.6 per cent of total emissions from the industrial processes sector. Also, CO_2 emissions from iron and steel production decreased from 28.45 Gg CO_2 eq in 1990 to 15.58 Gg CO_2 eq in 2005, when the only steel production plant in Denmark closed. This decline in emissions was countered by a rise in emissions from consumption of halocarbons and SF_6, which increased from 325.63 Gg CO_2 eq in 1995 to 790.77 Gg CO_2 eq in 2012. Within the industrial processes sector, 54.0 per cent of the emissions were from mineral products, followed by 44.0 per cent from consumption of halocarbons and SF_6, 1.8 per cent from other (industrial processes) and 0.1 per cent each from other production and chemical industry. Emissions from metal production and production of halocarbons and SF_6 were reported as "NA" and "NO".

26. Denmark has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector. Recalculations made by Denmark between the 2013 and 2014 annual submissions for the year 2011 were in the following categories: mineral products and chemical industry. The recalculations were made in response to the 2013 annual review report and following changes in AD. Compared with the 2013 annual submission, the recalculations decreased emissions in the industrial processes sector by 2.42 Gg CO_2 eq (0.2 per cent) in 2011 and had a negligible impact on total national GHG emissions. The recalculations were adequately explained.

27. Denmark has made recalculations between the 2013 and 2014 annual submissions for the solvent and other product use sector. The most significant recalculation was in the following category: other (solvent and other product use). The recalculation was made following changes in AD. The recalculation increased emissions in the solvent and other product use sector by 0.64 Gg CO_2 eq (0.4 per cent) and had a negligible impact on total national GHG emissions. The recalculations were adequately explained.

2. Key categories

Cement production – CO_2

28. In 2012, CO_2 emissions from cement production was the largest category of emissions in the industrial processes sector, accounting for 48.4 per cent of total sectoral emissions. The emissions were calculated for the single cement-producing plant in the country using three different methods: a tier 1 method for the period 1990–1997; a tier 2 method for the period 1998–2005; and a tier 3 method using European Union Emissions Trading System (EU ETS) data for the period 2006–2012. In previous review reports, the ERT recommended that Denmark provide information on imports and exports of cement for the years 1990–1997 in order to ensure that the tier 1 method is being implemented in accordance with the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). Denmark has responded to this issue in its 2014 NIR by providing information on production, import and export of clinker, and on white and grey cement for the years 1990–2012. The ERT concludes that the mass balance of cement production, the EFs for each cement type and the emission calculations are complete and accurate and result in a consistent time series, in line with the IPCC good practice guidance. The ERT commends Denmark for improving transparency in this category.

29. In previous review reports, the ERT recommended that Denmark provide relevant information to clarify whether cement kiln dust (CKD) is included in the emission estimates for the years prior to 1998. In response to questions raised by the ERT during the current review, Denmark explained to the ERT that the 'loss on ignition' method is used to estimate the EFs for the years 1990–1997. This method estimates the CO_2 emissions based on full oxidation of all carbonate materials. As a result, there is no need to consider CKD when using this methodology. A correction for CKD would overestimate the emissions. The ERT considers that the 'loss on ignition' method is applicable for estimating the

emissions and is consistent with the IPCC good practice guidance. All CO_2 emissions generated during cement production have been taken into account. The ERT accepts the explanation from Denmark but reiterates the recommendation made in the previous review report that the Party provide detailed explanations in the NIR in order to improve transparency.

30. Denmark reported the AD, EFs and CO_2 emissions for cement production in the NIR. The ERT noticed that one set of the IEFs (tonnes of CO_2 per tonne of total cement equivalent) were reported for the years 2005 (0.50 t CO_2/t) and 2007 (0.48 t CO_2/t) only. However, the footnote to the table indicated that the EFs were reported for the period 2005–2012. In response to a question raised by the ERT during the review, Denmark provided the IEFs for the years 2008–2012 (ranging from 0.45 t CO_2/t in 2008 to 0.49 t CO_2/t in 2011). The ERT welcomes the Party's response and recommends that Denmark improve the QA/QC procedures in order to avoid such omissions.

Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6[5]

31. Denmark has reported the AD for the amounts of HFCs remaining in products at decommissioning as "NE" (not estimated) in many subcategories, such as HFC-125, HFC-134a and HFC-143a for domestic refrigeration; HFC-125, HFC-134a, HFC-143a, HFC-152a and HFC-32 for commercial refrigeration; HFC-125, HFC-134a and HFC-143a for transport refrigeration; HFC-134a for mobile air conditioners; and HFC-134a for aerosols. The Party has also reported the AD for the amount of SF_6 remaining in products at decommissioning as "NE". During the review of the 2013 annual submission, Denmark explained to the ERT that according to Danish law, refrigerators, air-conditioning equipment and aerosols/metered dose inhalers must be emptied before decommissioning by recovery, reuse or destruction of the remaining gases. The previous ERT accepted this explanation but recommended that the Party change the notation key from "NE" to "NO". As this has not been done in the 2014 annual submission, the ERT reiterates the recommendation made in the previous review report that Denmark report the emissions from these subcategories as "NO", provide a detailed explanation to improve transparency and improve the QA/QC checks for the use of notation keys for the entire time series.

32. Denmark continues not to estimate the AD for HFCs remaining in hard foam at decommissioning. In response to questions raised by the ERT during the previous review, Denmark explained that an applicable methodology could be derived from an ongoing project within the European Union (EU). The Party indicated that any new methodology would be applied once the projects have been finalized and if it is found that the results are appropriate for the Danish conditions and in line with the IPCC good practice guidance. The current ERT notes that a new methodology has not been applied in the 2014 annual submission. In response to an earlier draft of this report, Denmark informed the ERT that the results of the European study did not provide the possibility of deriving a methodology. The ERT further notes that the under-reporting of AD does not lead to an underestimation of emissions, as Danish law requires users to recover any remaining gas at disposal and either reuse or destroy it. Nevertheless, the ERT reiterates the recommendation made in the previous review report that Denmark estimate the AD for HFCs remaining in hard foam and verify that, consistent with Danish law, emissions from disposal are not occurring.

3. Non-key categories

Lime production – CO_2

[5] SF_6 emissions from this category are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

33. Denmark has reported the emissions from lime production using EFs recommended by the IPCC good practice guidance and from the EU ETS data. One Danish company, which accounts for approximately 75 per cent of total lime production in Denmark, is covered by the EU ETS. The company reporting to the EU ETS applies the EF of 0.79 t CO_2/t lime produced. The ERT noted that the IEF for 2011 (0.61 t CO_2/t) is 18.1 per cent lower that the IEF for 2010 (0.74 t CO_2/t), and the IEF for 2012 (0.64 t CO_2/t) is 13.2 per cent lower than the IEF for 2010. In response to questions raised by the ERT during the review, Denmark explained that the AD values reported in the period 2011–2012 are too high, due to the double counting of AD for hydraulic lime, which causes the IEFs in these years to be lower than in 2010. Denmark further noted that the emissions have been reported correctly. The ERT requested Denmark to provide the correct AD for the years 2011 and 2012. The Party reported that the amounts of slaked lime in 2011 and 2012 should be 3.00 kt and 2.99 kt, respectively. This causes the IEFs to increase from 0.61 t CO_2/t to 0.77 t CO_2/t in 2011 and from 0.64 t CO_2/t to 0.77 t CO_2/t in 2012. The ERT accepts this explanation and recommends that Denmark correct the AD for lime production and improve its QA/QC procedures.

Other production – CO_2

34. The ERT noted that Denmark estimated CO_2 emissions from refining of sugar for the years 1990–2005 using production statistics and assumptions (consumption of calcium carbonate per tonne of sugar and 90 per cent precipitation of calcium oxide), based on environmental reports for the year 2002. It also noted that for the years 2006–2012, the CO_2 emissions were based on data reported to the EU ETS. In response to questions raised during the previous review, Denmark explained that a comparison between the two methodologies for the entire time series will be presented in the 2014 NIR to help demonstrate time-series consistency. However, this information was not included in the 2014 NIR. The ERT therefore reiterates the encouragement in the previous review report that Denmark provide this additional information in order to improve transparency.

Consumption of halocarbons and SF_6 – SF_6

35. The use of SF_6 in double-glazed windows was introduced in 1991 with the lifetime of double-glazed windows assumed to be 20 years. At the end of the lifetime, all SF_6 contained in double-glazed windows will be emitted. In Denmark, the use of SF_6 in double-glazed windows ceased in 2001. As a result, SF_6 emissions from this source would be assumed to occur until the year 2021. In the 2014 annual submission, Denmark reported the amount of fluid remaining in the product at decommissioning as "NO", although emissions would be expected to be reported for this period of the cycle, beginning in 2011. In response to a question raised by the ERT during the review, Denmark indicated that these emissions were reported under stock, as opposed to under disposal, and agreed that they should be reallocated to disposal. The ERT recommends that Denmark report the SF_6 emissions remaining in double-glazed windows at decommissioning separately from the emissions from stocks, and if not possible, change the notation key from "NO" to "IE" (included elsewhere).

36. Denmark reported the amount of SF_6 accumulated as stock in electrical equipment and in double-glazed windows in its NIR (page 345, table 4.38). The ERT noticed that the amounts of SF_6 accumulated as stock in electrical equipment and in double-glazed windows from 2007 to 2012 were reported as the same values in the NIR (ranging from 75.45 t in 2007 to 89.66 t in 2012). These are different from the values reported for double-glazed windows in CRF table 2(II).F (35.76 t in 2007 and 29.39 t in 2012). In response to a question raised by the ERT during the review, Denmark explained that the SF_6 accumulated as stock in electrical equipment has been copied for double-glazed windows since 2007 in the NIR, but that the reporting in the CRF tables is accurate. The ERT recommends that the

Party correct the amount of SF_6 accumulated as stock in double-glazed windows and improve its QA/QC procedures to avoid such errors.

Solvent and other product use – N_2O

37. Denmark reported N_2O emissions from aerosol cans as "NE". In response to questions raised during the previous review, Demark explained to the ERT that efforts are ongoing to collect data on the used amounts of canned whipped cream and the content of N_2O, but it is not clear when all the data will be available for the GHG inventory. The ERT welcomes the Party's efforts and encourages Denmark to continue its efforts to collect data and report the emissions in its annual submission.

D. Agriculture

1. Sector overview

38. In 2012, emissions from the agriculture sector amounted to 9,608.67 Gg CO_2 eq, or 18.4 per cent of total GHG emissions. Since 1990, emissions have decreased by 23.3 per cent. The key drivers for the fall in emissions are the reduction in cattle (dairy and non-dairy) from more than 2.24 million head in 1990 to 1.61 million head in 2012, and the decrease in N_2O emissions from agricultural soils as a result of the reduction (by more than 50 per cent) in the use of synthetic fertilizers (from 386,511,910.48 kg nitrogen (N)/year in 1990 to 181,345,116.79 kg N/year in 2012). Several measures that have been implemented at the national and regional levels, such as the improvement in animal food efficiency and improvements in the utilization of N, have led to reduced emissions per produced kilogram of meat or per hectare and a halving of N use in synthetic fertilizers. Within the sector, 52.1 per cent of the emissions were from agricultural soils, followed by 30.3 per cent from enteric fermentation, 17.6 per cent from manure management and less than 0.1 per cent from field burning of agricultural residues. Emissions from rice cultivation and prescribed burning of savannas were reported as "NO" and "NA", respectively.

39. Denmark has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculation made by Denmark between the 2013 and 2014 annual submissions was in the agricultural soils category. The recalculation was made in response to the 2013 updated version of the European Environment Agency/European Monitoring and Evaluation Programme *Air Pollutant Emission Inventory Guidebook*, which changed the EFs for ammonia (NH_3) from synthetic fertilizers. The recalculations have increased N_2O indirect emissions from atmospheric deposition, but decreased direct N_2O emissions from synthetic fertilizers. Compared with the 2013 annual submission, the recalculations decreased emissions in the agriculture sector by 3.02 Gg CO_2 eq (0.03 per cent) in 2011, and had a negligible impact on total national GHG emissions. The recalculations were adequately explained.

40. Since the previous annual submission, Denmark has improved the transparency of its reporting and included new information in the NIR (e.g. disaggregated data on the amount of crop residue used for feeding, bedding and energy production and a time series for crop yields; and AD for slurry used in biogas plants and the associated energy output). The ERT welcomes these improvements.

41. The ERT notes the ongoing work on the QA/QC improvement plan, which is being implemented in stages. In response to a question raised by the ERT during the review, Denmark indicated that it will report in the 2015 annual submission the results of stage IV of the work, which involves checking and comparing calculations of N excretion for all livestock production estimated by the Danish Centre for Food and Agriculture and also checking the register for N fertilization controlled by the Danish AgriFish Agency. In

response to the draft review report, Denmark informed the ERT that it will not be possible to implement the check and comparison of the total N excretion in the 2015 submission. The ERT looks forward to inclusion of these results of the check and comparison of N fertilization data in the 2015 annual submission. The ERT recommends that Denmark, to the extent possible, report the results of the check and comparison of total N excretion in the 2016 annual submission.

2. Key categories

Enteric fermentation – CH_4

42. The ERT noted that the number of dairy and non-dairy cattle has declined between 1990 and 2012. For dairy cattle, the population declined from 753,115 in 1990 to 587,189 in 2012, and for non-dairy cattle, the population declined from 1,485,982 to 1,019,637 in 2012. To explain these trends, the Party reported in the NIR that the number of cattle "…has decreased because the milk yield has increased while the total production of milk has been fixed by the EU milk quota". In response to questions raised by the ERT during the review, Denmark indicated that until 2015, total milk production in Denmark is determined by the EU milk quota. Increasing feed efficiency has resulted in higher milk production per cow, which means that fewer dairy cattle are needed to produce the amount of milk allowed by the EU milk quota. The Party further indicated that the decrease in the number of non-dairy cattle is mainly due to the fact that a smaller population of dairy cattle leads to a reduced number of calves and hence also fewer heifers and bulls, which are reported as non-dairy cattle. The ERT welcomes this explanation and recommends that Denmark include it in the NIR in order to improve transparency.

43. The previous review report noted an increase in the average gross energy intake for non-dairy cattle between 2005 (115.59 MJ/head/day) and 2007 (130.47 MJ/head/day) by 12.9 per cent (the average gross energy intake was relatively constant before 2005 and after 2007). In response to a question raised by the ERT during the previous review, Denmark explained that this increase was due to the use of new data for feed intake for heifers from 2007, which differed from the previous estimates. Instead of reporting a significant increase from one specific year, the estimate of the feed intake for 2007 was based on the interpolation of data, which is in line with the IPCC good practice guidance. In the previous review report, the ERT recommended that Denmark include a description of the interpolation method and parameters used in the NIR, but this has not been done. The ERT therefore reiterates the recommendation made in the previous review report that Denmark provide this information in the NIR.

Manure management – CH_4 and N_2O

44. Previous review reports have noted that the methodology used by Denmark to extrapolate the amount of slurry treated (used to estimate CH_4 and N_2O emissions from biogas-treated slurry) was not in line with the IPCC good practice guidance (section 7.3.2.2). Specifically, in the absence of country-specific data available for 2010 and 2011 on the amount of biogas-treated slurry, the Party assumed that the input parameters remained the same. The finding in the 2012 annual review report was that this was not consistent with the fact that the cattle and swine populations were increasing between 2009 and 2010. Although the 2012 annual review report noted that this was not an underestimation of emissions, the ERT recommended that Denmark improve the transparency of the AD used for biogas-treated slurry by providing additional documentation on the reduction potential or on the associated energy output. The ERT notes that Denmark has provided this information in the NIR of the 2014 annual submission and therefore commends the Party for this improvement in transparency and consistency with the IPCC good practice guidance.

Direct soil emissions – N_2O

45. The previous review report noted that although the total amount of N fixed by N-fixing crops increased between 2010 (0.77 Gg) and 2011 (0.83 Gg), the total area of N-fixing crops decreased from 724,132 ha in 2010 to 709,871 ha in 2011. According to the 2013 NIR, N_2O emissions from N-fixing crops were estimated based on the crop yield, also taking into account emissions from clover. In the previous review report, the ERT recommended that Denmark provide the time series for the crop yield in the NIR. The current ERT observed a similar pattern for 2012, although N fixed by N-fixing crops remained constant at 0.83 Gg for 2011 and 2012, and the total area of N-fixing crops decreased from 709,871 ha in 2011 to 683,983 ha in 2012. The ERT further noted that the NIR did not provide information on the crop yield for the complete time series, which is necessary for transparency and comparability. In response to a question raised by the ERT during the review, Denmark provided the complete time series for crop yields. The ERT concluded that the information was acceptable and the resulting emissions were accurately estimated. However, the ERT reiterates the recommendation made in the previous review report that the Party include this information in the NIR in order to improve transparency.

E. Land use, land-use change and forestry

1. Sector overview

46. In 2012, net removals from the LULUCF sector amounted to 837.12 Gg CO_2 eq. This represents a substantial change since 1990, when the sector was a net source of emissions, amounting to 5,282.76 Gg CO_2 eq. The key drivers for the rise in removals are the increase in removals from forest land (by 4,584.38 Gg CO_2 eq between 1990 and 2012) (although there have been large inter-annual variations over the time-series (see paragraph 50 below)) and the decrease in emissions from cropland (by 1,898.93 Gg CO_2 eq between 1990 and 2012) and wetlands (by 85.50 Gg CO_2 eq between 1990 and 2012). Emissions increased for grassland (by 371.05 Gg CO_2 eq between 1990 and 2012) and settlements (by 77.89 Gg CO_2 eq between 1990 and 2012). Within the sector, 4,441.51 Gg CO_2 eq of net removals were from forest land. Net emissions were reported from cropland (2,956.29 Gg CO_2 eq) and from grassland (554.89 Gg CO_2 eq). Settlements accounted for net emissions of 90.81 Gg CO_2 eq and wetlands accounted for 2.41 Gg CO_2 eq. Emissions from other land were reported as "NA" and "NO", and emissions from other (LULUCF) were reported as "NE".

47. Denmark has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Denmark between the 2013 and 2014 annual submissions were in the following categories: forest land and cropland. The recalculations were made following changes in AD (e.g. a revision of the land-use matrix and the provision of updated values from the National Forest Inventory (NFI)). Compared with the 2013 annual submission, the recalculations increased net removals in the LULUCF sector by 77.62 Gg CO_2 eq (2.9 per cent) in 2011. The recalculations were not adequately explained for many land categories. Therefore, the ERT recommends that Denmark elaborate on the explanation of any recalculations in its NIR in the annual submission.

48. The ERT noted that the explanation of how data sources have been combined and used to construct the land-use and land-use change matrices, as presented in the NIR, is not fully transparent and needs to be further clarified. In response to questions raised by the ERT during the review regarding this issue, Denmark provided additional documentation, which provided more clarity. Therefore, the ERT recommends that Denmark improve the transparency of its reporting on how data sources have been combined and used to construct the land-use and land-use change matrices by summarizing the information provided during the review on the methodology for estimating land use and land-use

change for the period between 1990 and 2011 and 2011 to 2012 in section 7.1.4 of its NIR. The text should provide a clear explanation of how the data were assembled to produce the land-use and land-use change matrices.

49. The ERT noted that the land-use transition period used to estimate changes in carbon stocks in soils for all categories differs from the 20-year default transition period provided in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). In response to questions raised by the ERT during the review regarding this issue, Denmark informed the ERT that it has chosen a 50-year transition period for conversion between all land categories, except for conversion to settlements where a 100-year transition period is used. In response to questions raised by the ERT during the review regarding the land-use transition periods used, Denmark informed the ERT that it considers that the default transition period provided in the IPCC good practice guidance for LULUCF is not suitable for Danish conditions due to the cold climate; therefore, the Party uses country-specific land-use transition periods. Denmark further informed the ERT that the transition periods were chosen based on an examination of soil organic matter degradation functions of the C-Tool model (which simulates soil organic matter decay based on long-term studies). The ERT recommends that Denmark improve the transparency of its reporting on the country-specific land-use transition periods chosen and how they were determined for each LULUCF land category by including the information provided to the ERT during the review in its NIR. In addition, the ERT encourages Denmark to provide information through independent model verification on how the land-use transition periods and associated methodology used to estimate emissions from soils following land conversion are unbiased.

2. Key categories

Forest land remaining forest land – CO_2

50. The ERT observed that there were large inter-annual variations in the carbon stock changes in living biomass in forest land remaining forest land; for example, between 2007 and 2008 (415.1 per cent), 2008 and 2009 (−108.3 per cent), 2009 and 2010 (570.4 per cent), and 2010 and 2011 (209.5 per cent). In response to questions raised by the ERT during the review regarding this issue, Denmark provided an explanation to the ERT that trends and variations from year to year are small compared to the overall size of the pools. The ERT recommends that Denmark improve the transparency of its NIR by including this information in its annual submission.

51. In the previous review report, the ERT recommended that Denmark provide additional information on the area and volume of clear cutting and the area subject to destructive disturbance in its next annual submission, subject to the availability of data. The ERT notes that no additional information has been provided in the 2014 annual submission. The ERT therefore reiterates the recommendation made in the previous review report that Denmark provide additional information on the area and volume of clear cutting and the area subject to destructive disturbance, subject to the availability of data.

Cropland remaining cropland – CO_2

52. The ERT noted that the information presented in the NIR on the methodology used to estimate emissions from areas previously classified as organic soils that do not qualify as organic by definition due to the depletion of the depth of organic soils through agricultural cultivation is not fully transparent and needs to be further clarified. In response to a question raised by the ERT during the review regarding how this approach was developed, Denmark provided additional information on the rationale for, and application of, the methods used. The ERT agrees with the approach described by the Party. The Party also

indicated that it has a study under way to develop a more detailed map for the 6–12 per cent national share of organic soils and that a university research group has started some measurements on this soil type that may be relevant for improving the approach. The ERT recommends that Denmark increase the transparency of the NIR by including this information in its annual submission. In addition, the ERT recommends that Denmark improve the accuracy of the emission estimates for this category by incorporating the results of the university research and mapping in future annual submissions.

53. Denmark observed differences between the area of cultivated organic soil reported in the agriculture and LULUCF sectors in the CRF tables of the Denmark Kingdom (Greenland). For example, for 1990, 74,473.15 ha of agricultural cropland on organic soils was reported in CRF table 5.B, while the area of cultivated organic soils reported in CRF table 4.D was 74,595.59 ha. In response to a question raised by the ERT during the review, Denmark informed the ERT that there was an error in the reporting of the area of cultivated organic soils in the CRF tables amongst the cropland and grassland categories and the agriculture sector (CRF table 4.D). The ERT recommends that Denmark accurately report these figures and improve the implementation of its QC measures.

54. Consistent with the issue raised in the previous review report, the ERT noted that Denmark reports large variations in the areas of set-aside (e.g. 3,861 ha in 1990, 200,751 ha in 2005 and 41,800 ha in 2012) without any explanation of the reasons for these large changes. In the previous review report, the ERT recommended that Denmark provide additional information on these large changes in its NIR, in order to help explain the estimates associated with cropland management practices. The ERT notes that no new information has been provided in the 2014 NIR. The ERT therefore reiterates the recommendation made in the previous review report that Denmark provide additional information on the large variations in the areas of set-aside to help explain the estimates associated with cropland management practices.

3. Non-key categories

Settlements – CO_2, CH_4 and N_2O

55. Denmark reported differences in the total area of settlements for Denmark Kingdom between the NIR (page 479) (465,779 kha in 1990, increasing to 491,286 kha in 2012) and CRF table 5.E (486,401 and 516,712 kha for 1990 and 2012, respectively) In response to questions raised by the ERT regarding the differences in reported areas, Denmark informed the ERT that the text of the NIR has not been updated since the previous annual submission. The ERT recommends that Denmark enhance its QA/QC procedures and accurately report the total area estimates in both the NIR and the CRF tables.

Biomass burning – CO_2, CH_4 and N_2O

56. The ERT noted that no AD values were reported in CRF table 5.V. In response to a question raised by the ERT during the review regarding this issue, Denmark informed the ERT that an error occurred when merging the CRF tables, whereby the AD for hectares of area burned were not reported. The ERT recommends that Denmark enhance its QA/QC procedures and accurately report the AD associated with biomass burning in the CRF tables.

F. Waste

1. Sector overview

57. In 2012, emissions from the waste sector amounted to 1,101.56 Gg CO_2 eq, or 2.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 32.1 per cent. The key drivers for the fall in emissions are the changes in waste treatment practices in

Denmark based on the improved regulations restricting landfilling for waste fractions containing combustible material, the enhancement of CH_4 recovery practices and composting of waste, as well as increasing biogas production and incineration of waste for energy purposes. Within the sector, 63.7 per cent of the emissions were from solid waste disposal on land, followed by 21.3 per cent from other (waste), 14.4 per cent from wastewater handling and 0.5 per cent from waste incineration.

58. Denmark has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Denmark between the 2013 and 2014 annual submissions were in the following categories: CH_4 emissions from solid waste disposal on land and other (waste). The recalculation for the category solid waste disposal on land was made following changes in AD classification due to the introduction of the new European Waste Code (EWC) system of data collection. For the category other (waste), the recalculations were made for vehicle fires due to updated data on vehicles, and for composting due to updated EFs for the sludge and organic municipal waste fractions. Compared with the 2013 annual submission, the recalculations increased emissions in the waste sector by 110.78 Gg CO_2 eq (10.8 per cent) in 2011, and increased total national GHG emissions by 0.2 per cent. The recalculations were adequately explained in the NIR, except for the recalculations of CH_4 emissions from wastewater handling. The ERT recommends that the Party provide all necessary explanations for the recalculations in the NIR to improve the transparency of the reporting.

59. The ERT commends the Party for implementing the planned category-specific improvement in the category solid waste disposal on land (namely, a new system of data collection), and for reflecting the changes in the NIR. The ERT encourages Denmark also to implement other planned data collection improvements for the category wastewater handling. The sector-specific QA/QC procedures are well documented, although the ERT found a few inconsistencies in the text, figures and tables in the NIR (e.g. table 8.3.2 does not correspond to the text under it and to the last paragraph before chapter 8.3) and recommends that the Party enhance the category-specific QC procedures in order to avoid discrepancies between the NIR and the CRF data.

2. Key categories

Solid waste disposal on land – CO_2 and CH_4[6]

60. The tier 2 first-order decay model was applied to estimate CH_4 emissions from solid waste disposal on land, in line with the IPCC good practice guidance. The AD are taken from the Danish Environmental Protection Agency database (1994–2009) and the recently implemented EWC system (2010–2012). The harmonization of solid waste types between the two systems was performed in accordance with the IPCC good practice guidance and reflected in the NIR, and the ERT commends the Party for this improvement. The previous review report noted that Denmark uses partly country-specific and partly IPCC default EFs for the model. The ERT reiterates the encouragement made in the previous review reports that the Party explore the opportunity of elaborating more country-specific parameters for the model, in order to improve the accuracy of the estimates.

61. The ERT noticed an inconsistency in the use of the notation keys "NE" and "NO" for CO_2-related cells in CRF table 6.A ("NE" for managed and "NO" for unmanaged waste). The Revised 1996 IPCC Guidelines indicate that CO_2 emissions from decomposition of organic material (e.g. crops and forest) are not treated as net emissions from waste, but, rather, if unsustainably produced, would be included in the methodologies under the agriculture and LULUCF sectors. Recognizing this, the ERT recommends that the Party use the notation key "NA" to report CO_2 emissions in CRF table 6.A.

[6] CO_2 emissions from solid waste disposal on land are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

62. The ERT commends the Party for implementing the recommendation made in the previous review report regarding reporting on the composition of the waste category "other combustibles" and assigning the proper degradable organic carbon values to each waste type.

Other (waste) – CO_2, CH_4 and N_2O

63. This category shows a steadily increasing trend of emissions from 61.11 Gg CO_2 eq in 1990 to 235.16 Gg CO_2 eq in 2012 due to the growth in waste composting. Emissions are estimated for compost production, accidental fires and gasification of biogas. The trends are adequately explained by the Party.

64. Compost production results from biological treatment of waste, and all three main GHGs are emitted, although CO_2 is considered biogenic and is therefore reported as "NA". In Denmark, composted types of waste include: garden and park waste; organic waste from households and other sources; sludge; and home composting of garden and vegetable food waste. AD are collected from waste treatment plants that have to register, weigh and categorize all streams of waste entering and leaving the plant. As the new EWC system is not yet fully implemented in this category, the data for the period 2010–2012 were estimated using extrapolation of older AD obtained from the former Information System for Waste and Recycling. The EFs are selected from the best available sources, taking into consideration country-specific conditions for aeration, mechanical agitation, moisture control and temperature, all of which influence the process of composting. The ERT commends Denmark for these efforts and encourages it to evaluate the data available from the new EWC system, when fully implemented, for its use in estimating emissions from compost production.

65. The NIR provides a detailed description of the subcategories accidental fires and biogas production. Accidental fires cover two sources: buildings and vehicles, both of which emit CO_2 and CH_4. Biogas production is described in the waste section of the NIR, although the estimates are reported in other sectors of the inventory depending on the waste origin and/or method of biogas generation/use (e.g. combustion and gasification). For instance, emissions from combustion of biogas are reported in the energy sector regardless of origin. Biogas production from organic waste and from manure (gasification of manure) for energy purposes is allocated and reported in the energy and agriculture sectors accordingly.

66. The ERT commends the Party for its comprehensive description of the category and for the updates of the estimates for vehicles fires and composting of organic municipal waste and sludge based on the newest and best available information from an external data source. However, the ERT finds that the reporting of the category needs to be improved with respect to the information provided on sludge spreading, fugitive emissions from biological waste, sludge and manure during biogas production, and flaring and venting, and recommends that Denmark enhance the transparency of its reporting on these activities and provide a clearer description thereof.

3. Non-key categories

Wastewater handling – CH_4 and N_2O

67. Denmark reports CH_4 and N_2O emissions from industrial, and domestic and commercial wastewater under wastewater handling in the NIR and CRF table 6.B, in line with the IPCC good practice guidance. CH_4 and N_2O emissions are reported for wastewater and sludge together under wastewater. No distinction is made between the emissions from industrial, and domestic and commercial wastewater treatment plants, as Danish industries are mainly connected to the municipal collector system where wastewater from households and industries is mixed before being treated in wastewater treatment plants. The

contribution of industrial influent wastewater in mixed wastewater increased to nearly 40 per cent in 2010 from zero in 1987. No AD are available for industrial wastewater treated in wastewater treatment plants, and only indirect N_2O emissions (from industrial effluents and surface rainwater, and effluents from scattered houses, agriculture and fish-farming) are reported in this subcategory based on AD (effluent N) from Danish Environmental Protection Agency reports (1994–2005) and the Agency for Spatial and Environmental Planning reports (2007 and 2010–2012), which is in line with the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (2006 IPCC Guidelines). N_2O emissions from wastewater treatment are calculated as the sum of direct (from treatment processes) and indirect (from discharged effluent wastewater) emissions. Country-specific EFs were derived for both direct N_2O emissions (based on two country-specific values of N load in influent wastewater for aerobic and anaerobic processes) and indirect N_2O emissions (based on contributions of N load from different effluents and the default (Revised 1996 IPCC Guidelines) value). Data on N load for direct N_2O emissions estimation are available from the Danish Water Quality Parameter Database.

68. CH_4 emissions for both domestic and commercial and industrial wastewater are reported only under domestic and commercial wastewater, for which total organic waste (TOW) is calculated based on population number (for 1990–1998), corrected with industrial effluent contribution figures, or based on measured biological oxygen demand values, obtained directly from the wastewater treatment plants (for 1999–2012) through the national monitoring system.

69. Total CH_4 is considered to be generated from only 58 wastewater treatment plants with anaerobic treatment, from which 99 per cent of the CH_4 is recovered. Thus, all emissions in this category result from fugitive emissions from the remaining 1 per cent of CH_4 from wastewater treatment plants with anaerobic treatment that is not recovered and from fugitive emissions from sewer systems, other aerobic wastewater treatment plants and septic tanks. The CH_4 EFs for all these sources are mostly taken from the 2006 IPCC Guidelines, based on a consideration of country-specific conditions. Thus, the methane conversion factor (MCF) for septic tanks is selected to be 0.5 for fugitive emissions from wastewater treatment plants, 0.003 for emissions from sewer systems based on expert judgement and 0.8 for anaerobic treatment plants. The ERT found that Denmark has resolved the issue noted in paragraph 60 of the previous review report with respect to CH_4 recovery and implemented the recommendation made in that report by providing the time series for CH_4 recovery in the NIR.

70. Compared with the previous annual submission, Denmark has changed the value of MCF for anaerobic digestion from 1.0 to 0.8 and lowered the value of inlet TOW by 2 per cent. In response to a question raised by the ERT during the review about the rationale for these changes compared with the 2013 annual submission, the Party referred to an unpublished study and actual measurements conducted in Denmark, stating that the previous value for TOW was incorrect and that the MCF of 0.8 better corresponds to the country-specific circumstances. The Party indicated that it would transparently document the rationale behind these changes in the next annual submission. The ERT agrees that Denmark is accurately estimating CH_4 emissions, and recommends that the Party improve the transparency of the NIR by documenting the data available and studies used to develop the country-specific factors. In addition, the ERT noticed that the recalculations made with respect to CH_4 emissions (based on these changes and the decreasing CH_4 emissions from 3.62 to 3.56 Gg CO_2 eq for 2011), are reflected in CRF table 8(a) and in the corresponding recalculations table 8.8.1, (chapter 8.8) in the NIR, but are neither reported nor described in the same chapter. The ERT recommends that Denmark justify the changes in the NIR.

71. In the previous review report, Denmark was encouraged to use updated values for the percentage of the population not connected to the collective sewer system and the

sludge factor treated anaerobically, in order to improve the accuracy of the emission estimates for wastewater handling. In response to questions raised by the ERT during the review, the Party informed the ERT that the statistical information on the percentage of the population not connected to the sewer system is expected to be obtained soon and will result in an updated assumption of the percentage used to date (10 per cent). The ERT encourages Denmark to review this figure based on the most recently available information and identify updated values for the percentage of the population without access to a sewer system.

72. Until 2007, Denmark maintained a sludge database; thereafter, the database was discontinued and Denmark has continued to report the last available data for the fraction of sludge treated anaerobically (0.34) from 2007 for future years. In response to questions raised by the ERT during the review, the Party indicated that it expects to obtain plant-level sludge-related data next year. Taking into consideration the multiple destinations and treatment modes of sludge and the complications caused by the lack of data on these fractions, the ERT recommends that the Party collect or estimate these data and reflect this in its annual submission.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

73. Table 6 provides an overview of the information reported and parameters selected by Denmark under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Assessment of Denmark's reporting in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1	Sufficient	
Activities elected under Article 3, paragraph 4	Activities elected: forest management, cropland management, grazing land management Years reported: 1990, 2008, 2009, 2010, 2011 and 2012	
Period of accounting	Annual accounting	
Denmark's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1	Sufficient	

74. Chapter II.G.1 includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities and the change from the first commitment period to the second commitment period, paragraphs 75–80 below contain the ERT's assessment of the Party's adherence to the current reporting guidelines and do not provide specific recommendations for reporting these activities in the 2015 annual submission.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO_2

75. The ERT noted the recommendation made in the previous review report that Denmark report on units of land harvested since the beginning of the first commitment period, and associated emissions and removals. In response to questions raised by the ERT during the review regarding this issue, Denmark provided additional information to explain that, as lands afforested and reforested are still less than 25 years old and because the rotation age for forest in Denmark is at least 40–50 years (spruce) and in many cases 100 years (beech), only minor harvests will occur in the afforested/reforested areas. Denmark also indicated that, thus far, the remeasurements of sample plots under afforestation/reforestation have not indicated a significant harvest. Denmark further explained that harvested areas and the associated emissions are not reported separately because the carbon stock change estimates for the category total (which are based on the NFI) include any changes in carbon stock as a result of harvesting. Denmark is not able to separately report harvesting on afforested and reforested lands. The ERT concluded that this issue was solved.

Deforestation – CO_2

76. The ERT noted that there was a substantial increase in the emissions from deforestation between 2011 (85.07 Gg CO_2 eq) and 2012 (110.20 Gg CO_2 eq). In response to questions raised by the ERT during the review regarding this issue, Denmark informed the ERT that, when calculating the emission estimates, an error was made in determining the carbon pools in the proportion of deforested areas that contained short-rotation Christmas trees for 2012. For these areas, the 2012 emission estimates were developed based on a fully stocked forest area as opposed to short-rotation Christmas trees, resulting in an overestimation of emissions. The ERT recommends that Denmark enhance its QC procedures to avoid such errors.

77. The ERT noted that the land-use transition period used to estimate changes in carbon stocks in soils for deforestation differs from the 20-year default transition period in the IPCC good practice guidance for LULUCF. Denmark explained why it chose transition periods that are different from the IPCC default transition periods (see para. 49 above). In response to additional questions raised by the ERT during the review as to why a 100-year transition period was chosen specifically for deforested lands that were converted to settlements, Denmark provided additional information to explain that the 100-year transition period was chosen based on an examination of the degradation rates of soil carbon pools (fresh organic matter, humified organic matter and resilient organic matter) using the C-Tool model. The ERT agrees with the explanation provided by Denmark, but recommends that the Party increase the transparency of the NIR by including this information in its annual submission, and perform a QA assessment of the approach used through independent model verification based on country-specific data relevant to deforestation.

Activities under Article 3, paragraph 4, of the Kyoto Protocol

Forest management – CO_2

78. No problems were identified.

Cropland management – CO_2 and N_2O

79. The ERT noted that the main AD for cropland management are the agricultural area data from Statistics Denmark. In response to questions raised by the ERT during the review with regard to how Denmark ensures that the national territory is covered by the AD used, the Party explained that although Statistics Denmark provides data for the major crops that cover 98–99 per cent of the agricultural area, the model still calculates emissions from the degradation of carbon for the entire agricultural area. The ERT accepts the explanation provided by Denmark, but recommends that the Party increase the transparency of the NIR by including this information, and validate the model results based on country-specific data.

Grazing land management – CO_2

80. No problems were identified.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

81. Denmark has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the standard independent investment report (SIAR) on the SEF tables and the SEF comparison report.[7] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10.The ERT reiterated the main findings contained in the SIAR.

82. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol

83. Denmark has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

84. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

[7] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

Table 7

Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO_2 eq

	2014 annual submission[a]		*2010, 2011, 2012 and 2013 annual submissions*[b]	
	As reported	*Revised estimates*	*Final*	*Final*	*Net accounting quantity*[c]
Afforestation and reforestation					
Non-harvested land	–183 906		–183 906	–255 085	71 179
Harvested land	0		0	0	0
Deforestation	439 844		439 844	320 390	119 454
Forest management	–1 172 604		–1 172 604	–981 971	–190 633
Article 3.3 offset[d]	–255 938		–255 938	–65 305	–190 633
Forest management cap[e]	–916 667		–916 667	–916 667	0
Cropland management	–8 249 295		–8 249 295	–6 512 723	–1 736 572
Grazing land management	556 538		556 538	144 217	412 321
Revegetation	NA		NA	NA	NA

Abbreviations: CRF = common reporting format, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA= not applicable.

[a] The values included under the 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2012.

[b] The values included under the 2010, 2011, 2012 and 2013 annual submissions are the final accounting values as a result of the 2013 review and are included in table 7 of the 2013 annual review report (FCCC/ARR/2013/DNK/Corr.1, page 1) in the column "2013 annual submission", "Final". This column is applicable only for Parties that elected annual accounting.

[c] The "net accounting quantity" is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission and where the quantities issued or cancelled based on the 2013 annual review report have been subtracted ("net accounting quantity" = final 2014 – final 2013 annual review report).

[d] "Article 3.3 offset": for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[e] In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

85. Based on the information provided in table 7 for the activity afforestation and reforestation, Denmark shall: for non-harvested land, cancel 71,179 assigned amount units (AAUs), emission reduction units (ERUs), certified emission reduction units (CERs) and/or removal units (RMUs) in its national registry; and for harvested land, neither issue nor cancel any units.

86. Based on the information provided in table 7 for the activity deforestation, Denmark shall cancel 119,454 AAUs, ERUs, CERs and/or RMUs in its national registry.

87. Based on the information provided in table 7 for the activity forest management, Denmark shall issue 190,633 RMUs in in its national registry.

88. Based on the information provided in table 7 for the activity cropland management, Denmark shall issue 1,736,572 RMUs in its national registry.

89. Based on the information provided in table 7 for the activity grazing land management, Denmark shall cancel 412,321 AAUs, ERUs, CERs and/or RMUs in its national registry.

Calculation of the commitment period reserve

90. Denmark has reported its commitment period reserve in its 2014 annual submission. The Party reported that its commitment period reserve has not changed since the initial report review (249,155,060 t CO_2 eq) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

91. Denmark reported that there are no changes in its national system since the previous annual submission. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

92. Denmark reported that there are changes in its national registry since the previous annual submission. The Party described the changes related to the name of or contact information for the registry administrator, database structure, conformance with technical standards and test results in its NIR. The ERT concluded that, taking into account the confirmed changes in the national registry, Denmark's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

93. Consistent with paragraph 23 of the annex to decision 15/CMP.1, Denmark provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

94. Denmark reported that there are no changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, since the previous annual submission. The ERT concluded that the information provided continues to be complete and transparent.

95. As Denmark reported in its 2011 annual submission, it assists developing country Parties, in particular least developed countries, to adapt to climate change. Under its Climate Change and Development Action Programme, Denmark has performed climate screening in Niger and Cambodia, conducting 17 studies on climatic parameters and climate change impacts on economic growth. Denmark invested 200 million Danish kroner (DKK) in Viet Nam through its Climate Change Adaptation and Mitigation Programme.

Since 2008, Denmark has allocated DKK 88 million for specific climate change projects to cover climate change related needs of developing countries.

96. Denmark implements its commitments under Article 3, paragraph 14, of the Kyoto Protocol as a member State of the EU. The EU has established a climate change impact assessment system that ensures that potential social, environmental and economic impacts on developing countries can be identified in all legislative proposals and initiatives, such as those related to trade, investment flows, international standards, development, costs, goods and services produced or consumed in developing countries (economy), those related to poverty level (social), and those related to GHG and ozone-depleting emissions, and adaptation capacity (environment), and minimized to the extent possible. Thus, EU directive 2009/28/EC on the promotion of the use of energy from renewable sources addressed the promotion of biomass and biofuels that showed potential impacts on third countries by introducing sustainability criteria, reflected in paragraph 17 of the directive after intense consultations with a wide range of stakeholders (including developing country representatives), in order to minimize the potential impact of biofuel use in transport and agriculture.

97. Denmark, as a member State of the EU, implements all EU policies striving to minimize adverse impacts caused by market imperfections, tax and duty exemptions and subsidies in GHG-emitting sectors; as well as by removing subsidies associated with the use of environmentally unsound and unsafe technologies; cooperating in the development, dissemination and transfer of advanced fossil-fuel technologies and/or technologies with GHG capture and storage that emit fewer GHGs; strengthening the capacity of countries to improve the efficiency of their fossil-fuel industries; and assisting developing countries that are dependent on fossil fuels to diversify their economies.

III. Conclusions and recommendations

A. Conclusions

98. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of Denmark, in accordance with the Article 8 review guidelines.

Table 8

Expert review team's conclusions on the 2014 annual submission of Denmark

Issue	*Expert review team assessment*	*Paragraph cross references for identified problems*
The ERT concludes that the inventory submission of Denmark is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2012		
Annex A sources[a]	Complete	
LULUCF[a]	Complete	
KP-LULUCF	Complete	
The ERT concludes that the inventory submission of Denmark has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	

Issue	*Expert review team assessment*	*Paragraph cross references for identified problems*
Denmark's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	Yes	
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
Denmark has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	
Did Denmark provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF).

B. Recommendations

99. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified.

Table 9
Recommendations identified by the expert review team

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
Cross-cutting	QA/QC	Enhance QC activities to avoid inconsistencies	No	11

Sector	*Category cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
		between the NIR and CRF tables		
Energy	Stationary combustion: gaseous fuels – N_2O	Describe the trend in the N_2O IEF for manufacture of solid fuels and other energy	Yes	24
		Improve QA/QC procedures and follow up on the recommendations made in previous review reports	No	24
Industrial processes and solvent and other product use	Cement production – CO_2	Provide detailed explanations in the NIR regarding the inclusion of emissions from cement kiln dust	Yes	29
		Improve QA/QC procedures	No	30
	Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6	Report the emissions from disposal from refrigerators, air-conditioning equipment and aerosols/metered dose inhalers as "NO", provide a detailed explanation to improve transparency and improve the QA/QC checks for the use of notation keys for the entire time series	Yes	31
		Estimate the AD for HFCs remaining in hard foam	Yes	32
		Verify that, consistent with Danish law, emissions from disposal are not occurring	No	32
	Lime production – CO_2	Correct the AD for lime production and improve QA/QC procedures	No	33
	Consumption of halocarbons and SF_6 – SF_6	Report the SF_6 emissions remaining in double-glazed windows at decommissioning separately from the emissions from stocks, and if not possible, change the notation key from "NO" to "IE"	No	35
		Correct the amount of SF_6 accumulated as stock in double-glazed windows and improve QA/QC procedures to avoid such errors	No	36
Agriculture	Sector overview	Report the results of the check and comparison of total N excretion in the 2016 annual submission, to the extent possible		41
	Enteric fermentation – CH_4	Provide the explanations provided during the review to explain the declining population of dairy and non-dairy cattle	No	42
		Include a description in the NIR of the interpolation method and parameters used for the average gross energy intake for non-dairy cattle	Yes	43
	Direct soil	Provide information on crop yield for the	Yes	45

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
	emissions – N_2O	complete time series		
LULUCF	Sector overview	Elaborate on the explanation of any recalculations in the NIR	No	47
		Improve the transparency of reporting on how data sources have been combined and used to construct the land-use and land-use change matrices by summarizing the information provided during the review on the methodology for estimating land use and land-use change for the period between 1990 and 2011 and 2011 to 2012 in section 7.1.4 of the NIR	No	48
	Forest land remaining forest land – CO_2	Improve the transparency of the NIR by including information to explain the large inter-annual variations in the carbon stock changes in living biomass	No	50
		Provide additional information on the area and volume of clear cutting and the area subject to destructive disturbance, subject to the availability of data	Yes	51
	Cropland remaining cropland – CO_2	Increase the transparency of the NIR by including information on the rationale for, and application of, the methods used to estimate emissions from areas previously classified as organic soils that do not qualify as organic by definition	No	52
		Improve the accuracy of the emission estimates for this category by incorporating the results of the university research and mapping in future annual submissions	No	52
		Accurately report figures on the area of cultivated organic soil reported in the agriculture and LULUCF sectors and improve the implementation of QC measures	No	53
		Provide additional information on the large variations in the areas of set-aside to help explain the estimates associated with cropland management practices	Yes	54
	Settlements – CO_2, CH_4 and N_2O	Enhance QA/QC procedures and accurately report the total area estimates in both the NIR and the CRF tables	No	55
	Biomass burning – CO_2, CH_4 and N_2O	Enhance QA/QC procedures and accurately report the AD associated with biomass burning in the CRF tables	No	56

Sector	*Category cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation*[a]	*Paragraph cross references*
Waste	Sector overview	Provide all necessary explanations for the recalculations in the NIR	No	58
		Enhance the category-specific QC procedures in order to avoid discrepancies between the NIR and the CRF data	No	59
	Solid waste disposal on land – CH_4 and CO_2	Use the notation key "NA" to report CO_2 emissions in CRF table 6.A	No	61
	Other (waste) – CO_2, CH_4 and N_2O	Increase the transparency of reporting on sludge spreading, fugitive emissions from biological waste, sludge and manure during biogas production, and flaring and venting	No	66
	Wastewater handling – CH_4 and N_2O	Improve the transparency of the NIR by documenting the data available and studies used to develop the country-specific factors	No	70
KP-LULUCF	Deforestation	Enhance QC procedures	No	76
		Increase the transparency of the NIR by including information in the NIR to explain the choice of transition periods that are different from the IPCC default transition periods, and perform a QA assessment of the approach used through independent model verification based on country-specific data relevant to deforestation	No	77
	Cropland management	Increase the transparency of the NIR by explaining how the AD for cropland management ensures that the national territory is covered, and validate the model results based on country-specific data	No	79

Abbreviations: AD = activity data, CRF = common reporting format, EF = emission factor, EU = European Union, IE = included elsewhere, IE = included elsewhere, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control.

IV. Questions of implementation

100. No questions of implementation were identified by the ERT during the review.

Annex I

Information to be included in the compilation and accounting database

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2012, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	**249 155 060**			**249 155 060**
Annex A emissions for 2012				
CO_2	39 984 594			39 984 594
CH_4	5 503 371			5 503 371
N_2O	5 968 956			5 968 956
HFCs	664 383			664 383
PFCs	8 535			8 535
SF_6	117 855			117 855
Total Annex A sources[c]	**52 247 694**			**52 247 694**
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	37 833			37 833
3.3 Afforestation and reforestation on harvested land for 2012	IE, NA, NO			IE, NA, NO
3.3 Deforestation for 2012	110 196			110 196
Activities under Article 3, paragraph 4, for 2012[d]				
3.4 Forest management for 2012	–4 479 347			–4 479 347
3.4 Cropland management for 2012	2 957 762			2 957 762
3.4 Cropland management for the base year	4 844 660			4 844 660
3.4 Grazing land management for 2012	524 520			524 520
3.4 Grazing land management for the base year	177 573			177 573
3.4 Revegetation for 2012				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, NA = not applicable, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11

Information to be included in the compilation and accounting database in t CO_2 eq for 2011

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2011				
CO_2	44 751 897			44 751 897
CH_4	5 559 105			5 559 105
N_2O	6 114 175			6 114 175
HFCs	765 778			765 778
PFCs	11 057			11 057
SF_6	73 191			73 191
Total Annex A sources[c]	**57 275 202**			**57 275 202**
Activities under Article 3, paragraph 3, for 2011				
3 3 Afforestation and reforestation on non-harvested land for 2011	–119 186			–119 186
3 3 Afforestation and reforestation on harvested land for 2011	IE, NA, NO			IE, NA, NO
3 3 Deforestation for 2011	85 073			85 073
Activities under Article 3, paragraph 4, for 2011[d]				
3 4 Forest management for 2011	–6 180 042			–6 180 042
3 4 Cropland management for 2011	3 196 181			3 196 181
3 4 Cropland management for the base year	4 844 660			4 844 660
3 4 Grazing land management for 2011	245 707			245 707
3 4 Grazing land management for the base year	177 573			177 573
3 4 Revegetation for 2011				
3 4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, NA = not applicable, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values of the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	49 580 731			49 580 731
CH_4	5 623 251			5 623 251
N_2O	6 046 559			6 046 559
HFCs	810 953			810 953
PFCs	13 270			13 270
SF_6	37 882			37 882
Total Annex A sources[c]	**62 112 647**			**62 112 647**
Activities under Article 3, paragraph 3, for 2010				
3 3 Afforestation and reforestation on non-harvested land for 2010	–279 790			–279 790
3 3 Afforestation and reforestation on harvested land for 2010	IE, NA, NO			IE, NA, NO
3 3 Deforestation for 2010	82 382			82 382
Activities under Article 3, paragraph 4, for 2010[d]				
3 4 Forest management for 2010	–3 754 698			–3 754 698
3 4 Cropland management for 2010	3 388 506			3 388 506
3 4 Cropland management for the base year	4 844 660			4 844 660
3 4 Grazing land management for 2010	214 831			214 831
3 4 Grazing land management for the base year	177 573			177 573
3 4 Revegetation for 2010				
3 4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, NA = not applicable, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values of the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13

Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	49 171 865			49 171 865
CH_4	5 582 109			5 582 109
N_2O	6 083 071			6 083 071
HFCs	805 408			805 408
PFCs	14 177			14 177
SF_6	36 689			36 689
Total Annex A sources[c]	**61 693 318**			**61 693 318**
Activities under Article 3, paragraph 3, for 2009				
3 3 Afforestation and reforestation on non-harvested land for 2009	–216 188			–216 188
3 3 Afforestation and reforestation on harvested land for 2009	IE, NA, NO			IE, NA, NO
3 3 Deforestation for 2009	80 875			80 875
Activities under Article 3, paragraph 4, for 2009[d]				
3 4 Forest management for 2009	259 392			259 392
3 4 Cropland management for 2009	2 663 519			2 663 519
3 4 Cropland management for the base year	4 844 660			4 844 660
3 4 Grazing land management for 2009	223 372			223 372
3 4 Grazing land management for the base year	177 573			177 573
3 4 Revegetation for 2009				
3 4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, NA = not applicable, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values of the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 14
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	51 600 998			51 600 998
CH_4	5 669 117			5 669 117
N_2O	6 444 976			6 444 976
HFCs	859 246			859 246
PFCs	12 791			12 791
SF_6	31 602			31 602
Total Annex A sources[c]	**64 618 730**			**64 618 730**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	393 426			393 426
3.3 Afforestation and reforestation on harvested land for 2008	IE, NA, NO			IE, NA, NO
3.3 Deforestation for 2008	81 317			81 317
Activities under Article 3, paragraph 4, for 2008[d]				
3.4 Forest management for 2008	–6 097 552			–6 097 552
3.4 Cropland management for 2008	3 768 035			3 768 035
3.4 Cropland management for the base year	4 844 660			4 844 660
3.4 Grazing land management for 2008	235 972			235 972
3.4 Grazing land management for the base year	177 573			177 573
3.4 Revegetation for 2008				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, NA = not applicable, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values of the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention. Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf# page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for Denmark 2014. Available at <http://unfccc.int/resource/docs/2014/asr/dnk.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2014. Available at <http://unfccc.int/resource/webdocs/sai/2014.pdf>.

FCCC/ARR/2013/DNK. Report of the individual review of the annual submission of Denmark submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/dnk.pdf>.

Standard independent assessment report template, parts 1 and 2. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Ole-Kenneth Nielsen (Department of Environmental Science, Aarhus University), including additional material on the methodologies and assumptions used. The following documents[1] were also provided by Denmark:

Elsgaard, Lars, L. Görres, C. Hoffmann, G Blicher-Mathiesen., K. Schelde and S. Petersen. 2012. *Net ecosystem exchange of CO_2 and carbon balance for eight temperate organic soils under agricultural management* Agriculture, Ecosystems and Environment 162 (2012) 52 – 67. Available at www.elsevier.com/locate/agee.

Jenkinson, D.S. and J.H. Rayner. (1977). The Turnover of Soil Organic Matter in Some of the Rothamsed Classical Experiments. *Soil Science*. Vol. 123, No.5. Rothamsted Experimental Station, England.

Johannsen, V. K., Nord-Larsen, T., Riis-Nielsen, T., Bastrup-Birk, A., Vesterdal, L., & Stupak, I. (2009). Acquiring and updating Danish forest data for use in UNFCCC negotiations. Forest & Landscape, University of Copenhagen. (Forest & Landscape Working Papers; No. 44/2009).

Levin, G., Blemmer, M., Gyldenkærn e, S., Johannsen, V.K., Caspersen, O.H., Petersen, H.S., Nyed, P.K., Becker, T., Bruun, H.G., Fuglsang, M., Münier, B., Bastrup-Birk, A. & Nord-Larsen, T. 2014. Estimating land use/land cover changes in Denmark from 1990 – 2012. Technical documentation for the assessment of land use/land cover changes for estimation of carbon dioxide fixation in soil. Aarhus University, DCE – Danish Centre for Environment and Energy, 34 pp. Technical Report from DCE – Danish Centre for Environment and Energy No. 38 http://www.dce.au.dk/pub/TR38.pdf

Olesen et al 2004. Jordbrug og klimaændringer - samspil til vandmiljøplaner _(Agriculture and Climate Change- Interaction of Two Plans) DJFMarkbr

[1] Reproduced as received from the Party

Annex III

Acronyms and abbreviations

AAU	assigned amount unit
AD	activity data
CER	certified emission reduction unit
CH_4	methane
CKD	cement kiln dust
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
CS	country-specific
D	default
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
EU	European Union
EU ETS	European Union Emissions Trading System
EWC	European Waste Code
Gg	gigagram
GHG	greenhouse gas: unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
GJ	gigajoule (1 GJ = 10^9 joule)
ha	hectare
HFCs	hydrofluorocarbons
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
kha	kilohectare
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
kt	kilotonne
LULUCF	land use, land-use change and forestry
MJ	megajoule
MCF	methane conversion factor
N	nitrogen
N_2O	nitrous oxide
NFI	National Forest Inventory
NH_3	ammonia
NA	not applicable
NE	not estimated
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
PS	plant-specific
QA	quality assurance

QC	quality control
RMU	removal unit
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
T1	tier 1
T2	tier 2
T3	tier 3
TJ	terajoule (1 TJ = 10^{12} joule)
TOW	total organic waste
UNFCCC	United Nations Framework Convention on Climate Change